Door ir. N.J. van der Kolk

Setting the Benchmark

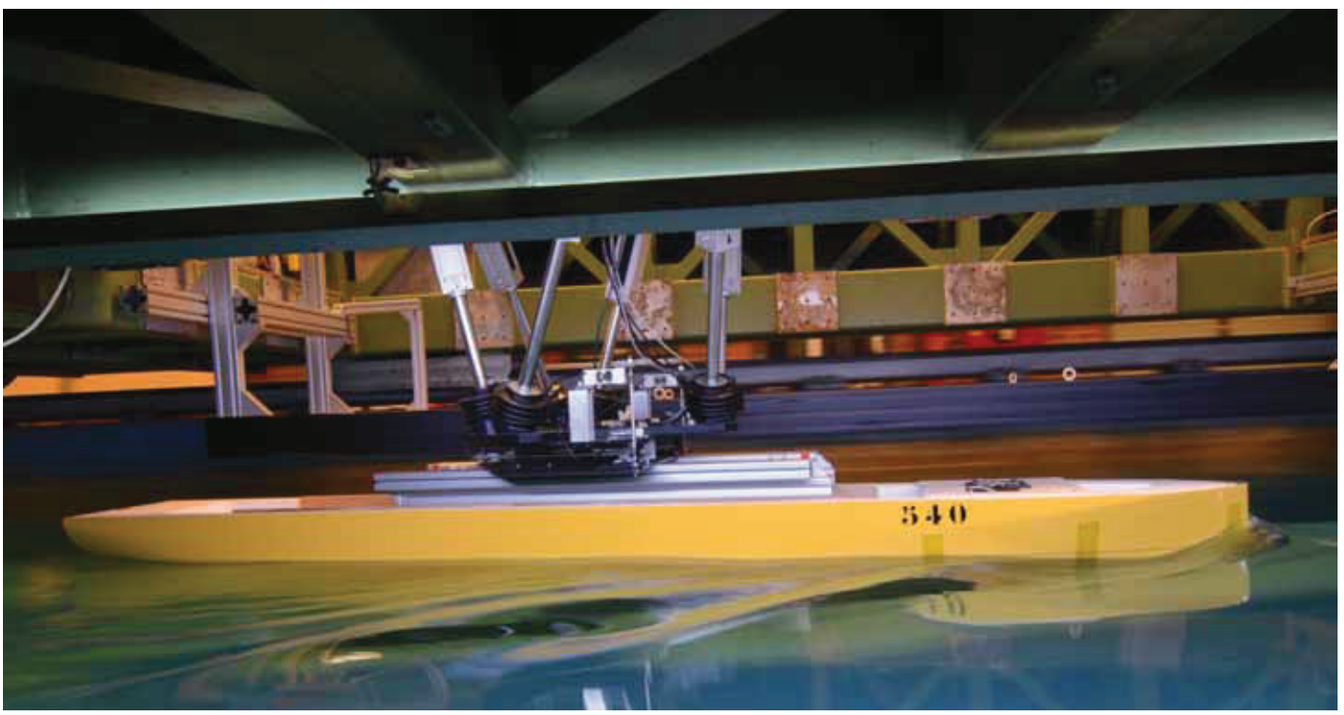
Wind-assist Research at Delft University of Technology

Wind energy as an environmentally friendly propulsion alternative for commercial ships is the subject of ongoing research at the Ship Hydromechanics department of Delft University of Technology. PhD candidates Giovanni Bordogna and Nico van der Kolk are developing a modelling tool for these hybrid ships following experiments using the Delft University's towing tank and the Polytechnic University of Milan's wind tunnel. The tool is to enable designers to explore the exciting possibilities offered by wind as an auxiliary propulsor.

Preliminary modelling for a retrofit case, a minimal intervention requiring some structural modifications, indicates that a thirty per cent reduction in fuel consumption is readily attainable. Looking further ahead, purpose-designed vessels operating on routes with beneficial wind conditions are foreseen operating in pure sailing mode. Recently, experimental work was conducted in support of the modelling tool at the Delft University of Technology towing tank and at the Polytecnico Milan wind tunnel.

Managing Flow Separation

Ensuring that wind-assist vessels have course stability is a key design concern. In recent towing tank experiments, the sailing performance of commercial hull-types fitted with diverse appendage configurations was investigated. The appendages tested are designed to operate inside the boundary layer – referring to bilge keels in particular – where the working mechanism is the promotion of flow separation. Management of flow separation along the bilges of the



The sailing performance of commercial hull-types fitted with diverse appendage configurations was tested in the Delft towing tank.

Nico van der Kolk is promovendus aan de Technische Universiteit Delft.

Call for Collaboration

Wind-assisted ship propulsion is a dedicated research theme at the Ship Hydromechanics section of Delft University of Technology. This research programme is conducted in close cooperation with partners across the Dutch maritime sector. Relevant research topics encompass a wide range of disciplines, extending beyond physical modelling to include logistics and economics. The further development of this promising technology, and its eventual implementation, will be made possible by these academic, research and industry partners working in concert. The Ship Hydromechanics section is actively pursuing further collaboration with parties interested in this work. Please contact n.j.vanderkolk@tudelft.nl for more information or to join in.

The Delft Rotor was tested at the Polytecnico Milan's wind tunnel.

hull promises to mitigate the strong "destabilising" yaw moment that is a consequence of lateral force production by commercial vessel hulls. Results from this experiment, which included 26 parametric variations for appendage configuration, will be used to formulate an empirical model for this type of appendage.

High Reynolds Number Flettner Experiment

Experiments on a large-scale Flettner rotor were carried out in the boundary-layer chamber of the Polytechnic University of Milan wind tunnel. The Flettner rotor is a device that makes use of the Magnus effect in order to generate a lift force. It is regarded as one of the most promising wind propulsors. The rotor tested (referred to as the Delft Rotor) had a diameter of 1 m and a span of 3.73 m. Such large dimensions were necessary to study the influence of different Reynolds numbers on the aerodynamic forces generated by the rotor. The Delft Rotor was equipped with two purpose-built force balances and two different measurement systems to determine the pressures on the rotor's outer skin. The highest Reynolds number achieved was Re = 10^6. This unique data set will be made public as a benchmark case for validation.